

CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society
Of America

Vol. XXIII NOV.-DEC., 1951 No. 6



FIG. 94. This Basuto woman carried *Aloe polyphylla* on her head from spot marked x. (See page 174)



CACTUS AND SUCCULENT JOURNAL

Published and Owned by the Cactus and Succulent Society of America, Inc., Box 101, Pasadena 16, California. A magazine to promote the Society and devoted to Cacti and Succulents for the dissemination of knowledge and the recording of hitherto unpublished data in order that the culture and study of these particular plants may attain the popularity which is justly theirs. North and South America \$3.00 per year; foreign \$3.50 by money order. Mail application to SCOTT HASELTON, Editor, 132 West Union Street, Pasadena 1, California. Editorial Staff: THE ENTIRE SOCIETY. Entered as Second Class Matter at Pasadena, Calif., under act of March 3, 1879. Published bi-monthly. We reserve the right to accept or reject advertising or articles sent to this JOURNAL.

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NOVEMBER-DECEMBER, 1951 (PRICE 50c)

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EDITORIAL

This bi-monthly issue completes Volume twenty-three. We take this opportunity to thank our loyal members who have contributed material for the JOURNAL and those who have supported it throughout these distracting years. We regret that we have been unable to increase its circulation to a size that warrants a monthly magazine, however, we are supplying the same number of reading pages per year as though it were a monthly. We are still holding to the same yearly rate of twenty years ago in spite of the fact that all other commodities have tripled in price.

In the next issue of the JOURNAL we will announce that we will bind JOURNALS again. The dead-line for sending them in will be January 31, 1952, and the price will be \$2.50 per volume.

We have enough material left over for another 32 pages among which we can mention the following: Principles of Plant Reproduction, Color Photography, Growing Cacti Out of Doors the Year Round, Mulching Practices for Cacti and Succulents, Oil Drum Cacti, New Species of *Crassula*, a feature Hawthorthia article, Dr. Clover's Methods of Collecting Cacti, Lime and Its Functions and many others. The valuable Backeberg list edited by Dr. Dawson will terminate with an index and the space will be devoted to the second section of The Morphology of Cacti which treats with the Flower; Dr. Kurtz has edited this section and readers will find interesting, new material.

The Staff and members of the Board take this opportunity to send holiday greetings to every one of its members and may 1952 bring world peace and harmony to individuals and all nations.

SCOTT E. HASELTON.

NOTICE TO AFFILIATES

The following plant articles are available to all affiliates of the Cactus & Succulent Society of America upon request:

Grafting Cacti
Desirable Mammillarias, other than hairy types
A Brief Review on the Genus *Sedum*
Plant Names
Euphorbia Notes
Rhipsalis
The Personal Tale of a Cactus Collector in Baja California, Mexico.

In addition there is a set of 100 35-mm. color slides on Cacti and Succulents of California and Arizona

which may be borrowed after depositing 5.00 with the Corresponding Secretary. Upon the safe return of the slides the \$5.00 will be refunded minus the postage required for mailing.

Any affiliate interested in borrowing either the articles or the slides, please write:

MRS. MARY GLADE, Corresponding Secretary
7600 Verdugo Crestline Drive
Tujunga, California.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUESTED BY THE ACT OF CONGRESS OF AUGUST 24, 1912. Of Cactus and Succulent Journal, published bi-monthly at Pasadena, for October, 1950. State of California, County of Los Angeles.

Before me, a notary in and for the State and county aforesaid, personally appeared Scott E. Haselton, who, having been duly sworn according to law, deposes and says that he is the Editor-Publisher of the CACTUS AND SUCCULENT JOURNAL, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Scott E. Haselton, Box 101, Pasadena.

2. That the owner is: CACTUS AND SUCCULENT SOCIETY OF AMERICA, INC.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. Cactus and Succulent Society is a nonprofit organization and issues no stock.

SCOTT E. HASELTON.

Sworn to and subscribed before me this 2nd day of October, 1951.

Notary.

G. H. Herr of La Verne, California, sent in a photograph of a *Trichocereus spachianus* eight feet, nine inches tall with a flower which opened July 12. Is this a world's record for height?



FIG. 95. *Pereskia corrugata* sp. nov. Cutak, showing leaf texture.

A NEW SCARLET PERESKIA

By LADISLAUS CUTAK

Horticulturist, Missouri Botanical Garden

In July, 1937, this humble servant was invited to Virginia to address a garden club at Woodberry Forest. Being only ninety miles from the Nation's Capital, he was strongly urged by Mrs. Julia du Pont Andrews to visit Washington, particularly the botanical garden and the USDA greenhouses. As a result, considerable time was spent in the glass ranges looking over the collection of cactus plants which were gotten together when Dr. Rose was engaged in taxonomic research with Dr. Britton. In the collection were scores of intriguing specimens which could not be identified and these became an obsession for study.

Returning to St. Louis, this cactophile made a report to Dr. George T. Moore, Director of the Missouri Botanical Garden, and plans were

made to acquire some of the cactus oddities for study and propagation. Due to existing rules and regulations it was not possible to acquire any of the plants as cuttings until three years later. Then in 1940 the first shipment arrived from the Bureau of Plant Industry, Glenn Dale, Maryland, but it did not contain any of the small oddities hoped for. The shipment consisted of 189 items including *Hylocereus*, *Selenicereus*, *Opuntia*, *Pereskia* and *Epiphyllum*, which, already were duplicated in the Garden's collection, but there were a few plants of promising nature, one of them a *Pereskia* with crinkled leaves. Due to limited space in our greenhouses, most of the duplicating material was discarded and only that saved which appeared different and worthy of cultivation.

The crinkly-leaved *Pereskia* was first rooted, then planted out in one of the beds in the Cactus House, later transferred to another more suitable location and allowed to develop into a handsome shrub. In 1949 one or two flowers made their appearance and then the following year bloomed again. In March, 1951, it began to blossom profusely and continued to produce flowers until late in October. An attempt was made to identify it but a check of herbarium material and available *Pereskia* literature revealed that it could not be duplicated. Furthermore, good kodachrome slides were despatched to various cactus specialists and nurserymen to learn whether it was known to them.

Even though the habitat of the plant is unknown at present (the meager data which accompanied the cutting proved erroneous), we are reasonably sure that it was collected somewhere in the wild by either Dr. Rose or one of his collectors and will eventually be found in nature. Since it appears to be one of the outstanding *Pereskias* for pot culture as well as for

outdoor plantings in frost free climates it will need a name and the writer is happy to supply it. The specific name was chosen to draw attention to the crinkled or crumpled appearance of the young leaves, which is a characteristic feature of this handsome plant.

The young branches of *Pereskia corrugata* are very fleshy, bright green, with nearly indistinct moonshaped areoles which may be without spines but usually showing 4 or 5 fanning out from the leaf axil. The spines at first are reddish brown with whitish bases soon becoming blackish and up to 10 mm. long, increasing in number with age. The leaf scar diminishes in size and the areole proper enlarges on the mature stems until it stands out like a small knob. Old stems, one inch in diameter in 10-year old plants, are Dark Cress Green* covered with thin parchment-like bark of Honey Yellow (light brown) which gives them a shining copper green look. The very young leaves at first are reddish to copper tinged and glossy, soon becoming dull, arranged in whorl fashion at the



FIG. 96. Details of *Pereskia corrugata* sp. nov. Cutak.

branch tips. The leaves are orbiculate to oblanceolate, long acuminate, with petioles up to 5 cm. long in the largest ones. Flowers are solitary to four in a cluster at terminal end of branches, medium-sized, and of a beautiful scarlet orange color. When examining the scarlet petals through a reading glass they appear to be dusted with gold. Axils of sepals do not bear any hairs or bristles.

Pereskia corrugata Cutak, n. sp.

Small tree or shrub, 24 dm. or more high; main stems covered with clusters of slender spines, up to 15 mm. long; branches Grass Green and smooth, but in age becoming Dark Greenish Olive and shining, bearing spines or sometimes naked; areoles quite large and elevated on the mature stems, with dirty white wool and 3-25 unequal blackish acicular spines, several of them bulbous at base; leaves petiolate, somewhat fleshy, conspicuously veined, oblanceolate acuminate, Grass Green on face, paler underneath, 8-32 cm. long, 3-7.5 cm. broad; flowers terminal, solitary or few-flowered, slightly fragrant, Scarlet usually suffused with orange in the center, 32 mm. long, 25 mm. broad; sepals 3, one much larger, Olive Yellow to orange on face, greenish on back; stamens erect,

white at base, orange to Nopal Red above, 1-1.5 cm. long, with white anthers; style pale Scarlet, 10-12 mm. long; stigma lobes usually 5, thick, white, slightly spreading; ovary truncate, somewhat 5-angled, naked and green; fruit not known.

Type specimen deposited in the Missouri Botanical Garden Herbarium from cultivated plant originally received from Bureau of Plant Industry, U. S. Department of Agriculture, Glenn Dale, Maryland, October, 1940, and flowered at Missouri Botanical Garden in 1951.

Pereskia corrugata Cutak sp. nov.

Frutex aut arbor, 24 dm. altus; ramis teretibus viridibus glabris, aculeis 3-4 ab axillis folium aut in caule fasciculatis; areolis in ramo magnis elevatisque, indumento sordide albedo vestitis, aculeis 3-25 inaequalibus acicularibus atrobrunneis vel nigris 5-15 mm. longis, pluribus basi bulbosis; foliis petiolatis oblanceolato-acuminatis corrugatis 8-32 cm. longis, 3-7.5 cm. latis; floribus apice ramulorum solitariis aut 3-4, parce fragrantibus, aurantio-coccineis vel quasi pulvo aureo sparsis, ca. 32 mm. longis, 25 mm. latis; petalis ca. 8, obovatis, 1.5-2.5 cm. longis; staminibus numerosis erectis ca. 1.5 cm. longis, filamentis aureis vel rubris basi albis, antheris albis; stylo gracili, pallide coccineis, 10-12 mm. longo, stigmatibus lobis 5, crassis albis; fructu ignoto.

*Color terms used are those of Ridgway's "Color standards and color nomenclature."

AN ALOE ENTHUSIAST

By G. W. REYNOLDS

From "African Wild Life"

What decided me to monograph the Aloes of South Africa? That is a long story. The decision was reached only after I had accumulated a large number of photographs and much data, and realised there was a need for such a book.

Some twenty years ago my first Aloe (which happened to be *A. Peglerae*) was collected near Pretoria. I brought it home, half buried the plant in the ground, swamped it with water—and it promptly died. I wanted to know why. Later, I learnt that most Aloes grow *on top* of the ground, not *in* it. It was only when Aloes were rested on top of the ground, on a well-drained slope, that they grew and flowered.

Gradually a large collection of Aloes from most parts of the Union was built up, and I wanted to know their correct names and relationships, photograph them and study them. Aloes are an acquired taste, they have a peculiar fascination all their own.

Never having enjoyed a botanical training, I wanted to learn something about affinities, grouping, classification and nomenclature in

general, but there was no English book available giving the desired information about our South African Aloes. The Division of Botany, Pretoria, and also the Bolus Herbarium and National Botanic Gardens, Cape Town, extended every assistance in the naming of material, but unknown to me, I had collected several species which were then new to science, and undescribed.

The last published revision of the Aloes was that of Berger in *Das Pflanzenreich* published in 1908. The descriptions were in Latin with the text in German. This all had to be translated and filed.

I then decided to try and master the subject, and perhaps one day be able to publish a book which would make readily available to others, the information I had eagerly sought for myself.

It then became necessary to study all available literature from the earliest days, and to try and disentangle what had been recorded about our Aloes.

The first task was to accumulate photographs

of the Title-page, pages of text and figures, from Dodonaeus *Stirpium Historiae* (1583) onwards. These photographs were mounted in albums in chronological sequence, and have proved an invaluable set of records for quick reference. They have enabled me, among other things, to include pre-Linnean (i.e. before 1753) citations with the synonymy of all the oldest known species. With their aid I have also been able to reproduce many of the earliest published illustrations of Aloes.

Doing all this led me along unexpected paths. I found, for instance, that the common Cape "Suikerbos" (*Protea mellifera*) had been illustrated as far back as 1605 in Clusius *Exoticorum*, while five other Cape plants, including a *Watsonia* and a "Chink" were illustrated in Swertius *Florilegium* in 1612. This is all the more interesting when one realises that Van Riebeeck never landed at the Cape, and founded the first European settlement there, until 1652.

These investigations led to others, until I had accumulated so much data that I decided to enlarge the scope and include introductory chapters dealing with early history, place names, maps, expeditions and journeys, famous travellers and botanists, etc. This research was all done with Aloe-seeing eyes only, and with a view to building up the complete Aloe picture as it exists today.

It might be mentioned in passing, that coloured drawings of four Aloes were done during Simon van der Stel's Expedition to Namaqualand in 1685-86. Copies in colour, based on those originals, can be seen today in the South African Museum, and the South African Public Library, Cape Town.

Then came the necessity for accurate descriptions and illustrations of all known species of Aloe in South Africa, wherever they grew. It was necessary to ascertain where they grew and when they flowered. I have always believed that "the picture tells the story," and that one good illustration is worth more than many pages of cold print.

I then decided to photograph every Aloe possible throughout the length and breadth of the land, and write up descriptions on the spot.

Extensive explorations and travels extended over many years, and involved travelling considerably over 100,000 miles, from the mountains of Basutoland to the Desert, and from ocean to ocean, in every corner of South Africa, but it made possible the illustrating in black and white of the 132 species, almost all of them in their natural surroundings, together with their individual flowers natural size. For the latter, I used plate glass to eliminate the shadows, and then, for effect, the final halftone blocks were

deep-etched. Many of the flowers so photographed were done in the veld, and if a wind was blowing I used an adhesive and stuck the flowers on to the glass. (Isn't it amazing how the wind comes up the minute one wants to put some specimens into a press?)

At a later stage the possibility of including "just a few" colour plates arose, so the entire Union was covered again, some localities several times. Different cameras, and various makes of colour-film were used, but many were the disappointments. Processing was then rarely carefully done, and results were often unsatisfactory for colour-block making. That applies to overseas firms as well as South African.

Eventually, in desperation, I imported a "One Shot" camera costing over £300. With this type of camera, balanced for daylight, three separate films are exposed simultaneously, i.e., one through red (A) filter, one through a green (B), and one through a blue (C5).

The three-colour separations are thus made in one shot on the spot, but there were more snags to be overcome — mostly from colour-block makers. So once again the Union was covered from ocean to ocean, with the One Shot camera, seeking suitable material for colour plates. Eventually, by using some "One-shots," and some transparencies, it was possible to include the 77 colour plates now found in the book.

Few realise the difficulties experienced in obtaining good exposures, and still fewer know just how much time and care are given by the colour etchers and book makers to get the best possible balance of colours in the finished plate.

Reproducing a colour drawing or painting presents little difficulty since the work is done in a studio with light of controlled colour temperature.

Outdoors, dealing with a living plant, one has to cope with wind, and anything from heavy overcast to clear sunny blue sky. Further, light values vary from hour to hour, and also as to whether the camera faces north, south, east or west.

There have been many disappointments, many failures, and much gnashing of teeth. On several occasions, to fill in a gap, I have journeyed hundreds of miles in the hopes of securing a photograph, only to find it was raining, or there was a heavy overcast sky and no sun, or blowing a gale, or there had been a veld-fire. If it happened to be a fine sunny day, then plants had perversely flowered earlier or later than usual that particular year. For the 77 colour plates in the book, there were at least four times that number of failures.

One of the most difficult colour plates to obtain was that of *A. polyphylla*, high up near the

top of Phurumela Mountain, 30 miles east of Maseru in Basutoland. Five times I climbed that mountain before obtaining the shot needed.

To reach the particular spot, one can travel by car—over the bare rock of a mountain top in one place—but the last five miles must be done on foot or horseback. On the first occasion, since I was more at home with my feet on the clutch pedal and foot brake than in stirrups, I asked for a nice, quiet, docile Basuto pony, and safely mounted (but not for long) we set off. I managed fairly well until we came to a stream when I all but slid down the pony's neck—how was I to know it wanted a drink? On the way back the pony seemed to be somewhat in a hurry, and I seemed to be coming down just as the pony was coming up. Later I found that there are times when the partaking of meals is more comfortable in a standing position.

Once, in the mountains near Barkly East, I found a bridge had been washed away, so decided to try and cross the stream at the old wagon drift. After wading across and back, to be sure of a safe depth, I started across. All went well until the car was only a few feet from the far bank, when the left rear wheel began sinking in a quicksand, and kept on sinking until only the bottom of the rear window was above water. It took 18 oxen to drag the car out, and when safely out, instead of halting as respectable oxen should do, they careered across the veld dragging the car over the top of sundry rocks. When they finally stopped, and I tried to start the car, I found that the gear box had been cracked open. In moments such as these, I believe one may be pardoned for exclaiming, perhaps heatedly, "Dear me, this is provoking"—or words to that effect. (The Greeks have a word for it.)

On one occasion, I arrived at a certain small roadside hotel after dark, and booked in. I had the worst possible dirty old pants, torn jacket and slouch hat on, and being too impatient to wait until morning to try and find where *A. humilis* grew, I walked out of the hotel with a torch, sack, and small pick in my hands. I returned near midnight, having found what I sought, and slept soundly, leaving early next morning. It was not until I revisited the place a few months later that I was informed that the proprietor and his wife had spent a most anxious evening.

They considered I could be up to no good with a pick, torch, and sack late at night, and concluded I must be a typical Johannesburg criminal, so their wardrobe had been pushed up against the interleading door, and the old man had kept a shot gun handy all night. They had been relieved to see the last of me after break-

fast. When I explained the real purpose of my previous visit, they looked at me with incredulous eyes.

Being an amateur, and not a professional botanist, has had its advantages, and I have been able to approach the subject unfettered by prejudices.

Not having been born with a silver spoon in my mouth, and having to earn my living—whether I like it or not—has involved having to do two whole-time jobs at once. By working faster and cutting down on sleep, it has meant that speed was of paramount importance.

Obstacles had to be ruthlessly brushed aside. There was no time for illnesses. So much depends on one's state of mind and mental attitude. As far as one's body is concerned I firmly believe that the best thing to do with it is to feed it, clothe it, wash it—and forget it.

Trips to secure data and photographs had to be planned to occupy the least possible time, and the car was frequently pushed to the limit of its capacity. As an example, on one occasion, in order to secure material for a colour plate of *A. Thraskii*, I left Johannesburg at 8 a.m. and arrived at Isipingo Beach, south of Durban (420 miles) at 6 p.m. Next morning I photographed *A. Thraskii* and left at 9 a.m. for home, arriving at 7 p.m. Many trips had to be organised at speed, since I could not leave my Optical business for long.

One of the most memorable trips was a round-the-Union dash in July, 1948. On that occasion I had the good fortune to have a true lover of South Africa and its flora, Dr. N. R. Smuts, as my companion, and we travelled hard and fast. Westwards we sped to Upington, Keimoes (where magnificent flowering specimens of *A. dichotoma* occur) Springbok and Port Nolloth, a thousand miles away, on the Atlantic. From Port Nolloth northwards to Grootderm and Hells Kloof we continued, and at long last I secured colour plates of rare Aloes in those regions which had been missed on previous journeys. We returned to Port Nolloth, and drove southwards to Kleinsee to photograph *A. arenicola*, and thereby hangs a tale. Only one plant of *A. arenicola*, with flowers, was found growing amidst dried brushwood. I instructed our "boy" to be extra careful not to damage the flowers when clearing the twigs away, but when I looked up after unpacking the cameras, lo and behold the flower spike had been broken in two. It was exasperating after having travelled so far. I must have said something suitable to the occasion, since I noticed Dr. Smuts walking discreetly away with his fingers pressed to his ears. However, with the aid of a match, the peduncle was "repaired" and remained erect just long

enough for me to get a colour shot of it.

Proceeding via the breath-taking Spektakel Pass to Springbok, we continued southward to Khamieskroon for *A. khamiesensis*, and on to Cape Town in the hopes of getting *A. succotrina*. Three previous visits had been fruitless, but on this occasion plants were flowering well at the very summit of the Karbonkelberg, near Hout Bay, and I secured a grand colour shot in clear sunlight. At long last the Aloes book would contain a colour plate of *A. succotrina* in its natural home—so I thought. We hurried over to Paarl and Du Toit's Kloof, where I spotted a lovely early flowering specimen of the unique "Fan Aloe" *A. plicatilis*. This was duly photographed with the One Shot camera, but when I tried to replace one of the slides, I found to my horror that I had inadvertently pulled out the back slide, and not the front one, and by so doing had ruined the lovely shot of *A. succotrina*. So, we turned back and slept at Hout Bay. It rained all night, and notwithstanding heavy rain in the morning, way up to the summit of the Karbonkelberg we went again, the fifth time for me. The rain continued, and when after some hours of waiting, in the rain, with no hope of the weather clearing, I had to abandon it. And that is the reason why no colour plate of this classical species, so swathed in history, is included in the book.

From Cape Town, Dr. Smuts and I journeyed to Worcester, Swellendam, Mossel Bay, Willowmore, Somerset East, Grahamstown, Umtata, Kokstad and Pietermaritzburg to Greytown and Muden, where countless thousands of *A. mudensis* put up a glorious display of massed colours in July. From Muden we travelled to Dundee, Vryheid and Louwsburg, then home to Johannesburg.

The trip of 4,000 miles was completed in 20 days, and was responsible for about 30 of the colour plates now included in the book. It was a "now or never" trip, but for once the weather was perfect throughout—except for the Karbonkelberg and *A. succotrina*—and the various species were flowering well.

I made up for previous failures by securing all but one of the colour plates I had hoped for, plus two I never expected.

Every one of the 77 colour plates in the book has its story, but one cannot recount them all here.

I have collected and photographed plants on a large number of farms throughout South Africa, and have always asked permission whenever a farm house was in sight. I have received the utmost help from farmers, in fact, a more kindly, loveable, and warm-hearted person than the average Afrikaner "backvelder" would be

difficult to meet.

So, after many years of toil, after much burning of midnight oil, and often burning the candle at both ends, the "Aloes of South Africa" has at last seen the light of day. I am grateful to all who have helped in the task, and perhaps most of all to my wife who never complained, when left to care for herself and the children alone while I was away. She has been an unfailing source of encouragement and inspiration, and I am grateful.

I have been asked whether I will now "rest on my laurels." The answer is that no so-called laurel is worth resting on. An anthropomorphic halo is a pretty useless thing, it has only to drop a few inches to become a noose. Besides (as my wife reminds me) only dead wood drifts down stream, and there is much more to do.

Any plans for the future? Yes, at the moment I am toying with the idea of producing a book of Transvaal Wild Flowers, in which as many Transvaal flowering plants as possible will be illustrated in natural colours as they grow wild.

Such lovely things at Streptocarpus, Dierama, Water Lilies, Arum Lilies, Barberton Daisies, Watsonias, Crinum, Brunsviegias, Ammocharis, Bauchinia, Erythrinias, not forgetting a few Aloes, lend themselves admirably to colour plate making. The wonderful wild flowers of the Cape have been abundantly popularised; the time is opportune for similar treatment of the Transvaal's floral gems.

The Aloes of Tropical Africa are also in need of attention, but that gigantic task is in the lap of the gods.

ROUND ROBIN NEWS

We are drawing close to the end of 1951. What a busy and happy year this has been for our Round Robins! At the moment there are 11 of these Round Robins flying around to members in the United States, Canada, and across the two oceans to England and to New Zealand. The list now includes the following: Nos. 1, 2, 3 and 4 and International No. 1 on the general subject of cacti and other succulents; the special subjects are covered in Euphorbias, Mesembryanthema, "Rain Forest" Plants and "Succulents Only" besides Round Robins on Dish Gardens and the most recent one on exhibiting of plants at the hobby or local shows. I have enjoyed my part in this activity and should like to thank all of you for your wonderful letters and the generosity you have shown in sharing with me cuttings of your precious plants. I sometimes wonder if I can ever repay you. Let's hope that 1952 will be an active one for the Round Robins and that we shall go on and on, sharing our experiences and joys in collecting these unusual plants.

MABEL H. FAY

EDITOR'S NOTE: We appreciate the countless hours that Mrs. Fay has devoted to the Society's Robins. The first issue of the 1952 JOURNAL will carry a detailed report.



FIG. 97. *Aloe Marlothii* Berger

Near Boyne, 24 miles east of Pietersburg, Northern Transvaal; flowering in June.
Height 15 ft. The Euphorbia is *E. ingens*.

(Plate 72 from "Aloes of South Africa")



FIG. 98. *Villadia guatemalensis* cultivated in green-house, Ithaca, N. Y. Plant originally from Sierra de San Felipe, Oaxaca, C 6073. (X 1/5).

Probable Identity of *Villadia guatemalensis* and *Villadia levis*

By ROBERT T. CLAUSEN

Dr. J. N. Rose¹ described *Villadia guatemalensis* in 1909. The type was collected by W. R. Maxon and R. Hay near Chuacús, between Salamá and Las Canoas, Dept. of Baja Verapaz, Guatemala. The holotype is sheet No. 473393 in the U. S. National Herbarium. The plants as originally collected were devoid of foliage and in fruiting condition. Living specimens which were brought back to Washington and cultivated there flowered in January, 1906. A dried specimen of this flowering material, probably to be regarded as a paratype, sheet No. 399685 in the U. S. National Herbarium, is shown in the accompanying photograph. This cultivated plant or plants seems to have been the primary basis for Rose's published description of the new species. Since 1905, nobody appears to have collected *V. guatemalensis* in the field. Standley and Steyermark² reported that they had seen no material of this species.

¹Contr. U. S. Nat. Herb. 12:396.

²Fieldiana: Botany. 24 (pt. 4): 415. 1946.

Also in 1909, Rose³ described *Villadia levis* from near Santa Catarina in Oaxaca. A photograph of a cultivated plant of this is shown in Rose's plate 81 accompanying the original description. Study of the diagnoses of *V. guatemalensis* and *V. levis* indicates that they are similar and differ in few features. Such differences as are suggested are contrasted in the following table:

	<i>V. guatemalensis</i>	<i>V. levis</i>
branching	very much	more or less
length of		
leaves in cm.	1.5 - 2	2 - 3
flowers	few	in an elongated leafy spike
corolla	lemon-yellow	yellowish brown

Living plants of *Villadia levis* have come to me from several cultivated sources. In 1943, I had the chance to collect this species myself on the lower slopes of the Sierra de San Felipe, at an altitude of about 1830 meters, in Oaxaca, about 65 km. northwest of the type locality.

³Contr. U. S. Nat. Herb. 12: 440.

Plants there are too close morphologically to the type to be regarded as a separate species, but they differ from Rose's specimen in a number of ways. They are very much branched, as shown in figure 98. The leaves are only 0.56 - 1.4 cm. long, despite the vigor of the plants, as shown by the one illustrated. The petals are pale Dresden yellow speckled above the middle with red. The number of flowers in the spicate inflorescences varies from four to twelve. Such plants expand the known variation of *V. levis*. Further they resemble *V. guatemalensis* in all respects except in the color of the corolla which Rose described as lemon-yellow. Since he did not indicate whether this color was deep or pale and since the dried specimens are so faded that they can no longer be interpreted for this characteristic, the exact shade must be regarded as uncertain until *V. guatemalensis* can be recollected at its type locality. Meanwhile, that single characteristic remains as the only basis for separating two species, that is lemon-yellow versus pale Dresden yellow speckled with red. The importance of this difference is further diminished by two plants which I have grown from cuttings kindly supplied by Dr. Pacheco in 1944. These were cultivated in Guatemala City, but reported to have originated in the wild in Guatemala. Vegetatively, the two plants are good matches of *Villadia levis*, but the petals are pale uranium-green and a little longer than in *V. levis* from Oaxaca. In all other essential details of floral structure, they are like the plants from Oaxaca.

The conclusion that seems to be suggested by these data is that *V. guatemalensis* and *V. levis* probably should be regarded together as a single species. Since *V. guatemalensis* was described two months earlier than *V. levis*, that name has priority. In order to summarize all my descriptive data, the following expanded description of the composite species has been prepared: Much branched subshrubs attaining a height of 2.7 ("5") dm.; bark of trunks and old branches gray, of younger branches reddish brown and of youngest portions of stems green; one to several axillary shoots often developing on branches, these with the leaves closely crowded in rosettes; leaves sessile, widely divergent, at right angles to stems, linear, subterete, blunt or acutish, minutely papillose at apices and on dorsal keels, green, sometimes speckled with pink or red, 5.6 - 23 ("30") mm. long, 2.4 - 3.2 mm. wide, 1.4 - 2.8 mm. thick; flowers 3 - 17 in elongate, spicate cymes, 5-merous, sessile, 8 - 9 mm. in diam.; floral bracts ovate or lanceolate, 3 - 7 mm. long, 2 - 3 mm. wide; sepals 5, distinct, oblong, obtuse, much-thickened upwards and minutely papillose at apices, green, 3 - 3.4 mm. long, 1.2 - 1.6 mm. wide; petals connate basally



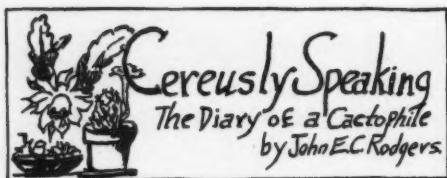
FIG. 99. Paratype of *Villadia guatemalensis* Rose. (X 1/4).

for 1 - 1.4 mm. long, erect below middle, then widely spreading and even recurved, lanceolate, obtuse, minutely hooded, pale uranium-green or pale Dresden yellow speckled or blotched above middle with red, 4.2 - 6 mm. long, 1.2 - 2 mm. wide; stamens with pale greenish filaments, sometimes suffused with pink below, 1.4 - 3.8 mm. long, those opposite petals inserted 1 - 1.5 mm. above base of corolla and alternate ones 0.6 - 1.2 mm. above base; nectaries broadly-reniform-spatulate, rounded, erose, orange to lemon-yellow, 0.6 - 0.7 mm. long, 0.7 - 0.8 mm. wide; pistils erect, connate basally for 0.5 mm., green, 4 - 4.6 mm. long, with styles slender, 2 mm. long; follicles suberect, 2.4 - 2.6 mm. long. Flowers in cultivation in Washington, D. C., and Ithaca, N. Y., in January and February.

In its amplified status, *V. guatemalensis* is one of the few species of Crassulaceae known both from Oaxaca and Guatemala. Two species of *Sedum* with this type of distribution are *S. dendroideum* and *S. batesii*.

For making available the specimens of *Villadia guatemalensis* in the U. S. National Herbarium, I am grateful to Dr. A. C. Smith. Likewise, I wish to express appreciation to Dr. Don Mariano Pacheco for his favor in sending me specimens from his private collection in Guatemala City.

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Perhaps it is just as well that the time for resting cacti is here as it gives me a breathing spell to read up on the "wonder preparations" of which chemical firms have written and sent samples and announcements. Several readers have asked me if I have used "Hypo-nex," "Red Arrow," "Loro," etc., on my plants. I had to admit that I had used them all but "Loro" which is something new. However, I still contend that your plants and mine are better off if good old Mother Nature's cure is applied, namely: the right soil, plenty of light, and plant sense.

With a large collection, the resting period is usually the best time to repot—either before spring growth commences or late fall and early winter (when I have the most time). I store my basic soil absolutely dry and untreated in an old fashioned flour bin that swings out from under a bench. On nearby shelves I have cans of old plaster (dust, to pieces of various size), dolomitic limestone, limestone, granite chips, charcoal, slacked lime, borax, gravel (various sizes), coarse sand, Vigoro, dried pulverized manure, peat moss, Vermiculite, tobacco dust, white sand, Bordeaux spray compound as well as various copper sprays such as "Volck," "Cediflora," etc. With these I can change the basic soil to "heavily basic" for South-westerners, or the "heavily humus" for Epiphytes as well as pre-pare sprays as needed for various types of succulents.

On my way home from the Convention in Denver I stopped off in Phoenix to see J. Whitman Evans and his collection. He does not issue a catalogue but his "Spare" are of the best. He keeps his lathhouse collection in tin cans with large holes in the bottom. His soils are a coarse mixture of native humus, crushed quartz, and decomposed granite. I ordered 15 varieties, quite shrunken from his enforced dry spell. Evans told me he'd water them thoroughly before shipping in the cans in which they are growing. They came right side up "believe it or not" with soil in cans as sent. He has his losses too even in such an ideal cactus paradise as Phoenix. I wanted to visit Rocking Horse Gardens but I had to leave that evening and one place was all the sun granted me that afternoon. It was also slightly warm—112°.

The Arizona native cacti, *Opuntias* mostly, were as thin as corrugated box boards from the drought of the last 18 months or more. The *Ferocacti* looked plump. *Carnegiea gigantea* in the fields along Van Buren Street in Phoenix were only slightly shrunken although many of them would be in danger by spring if the drought persists. The 40-foot palms had only a few green fronds above the dried ones; some palms in the northern part, where we came in, looked dead.

My late August visit to Hamilton, Vineland, and Toronto, in Ontario, Canada, netted me plenty of information regarding our Canadian cactophiles and their excellent plants. I was glad that Ben Veldhuis was at his Canadian exhibit of cacti at Floral Hall where I visited the Exposition. His Mexican patio of specimen cacti and succulents were well arranged and represented the well known genera. It was just as difficult to get near the exhibit and sales stand as it

is when any of us exhibit. At present there are no cactus clubs in Canada but several people are trying to form them in Hamilton and Toronto.

Dr. W. E. Hurlburt of Vineland, and I certainly did see cacti—from just-up-seedlings to 10-foot *Cerei*. Here at Ben Veldhuis' were beds inside and outside, lath and muslin houses, and hillsides with row after row. All plants were in excellent condition with germination almost 100%. His flats of seedlings were uniform in size and the whole layout free from "seeable" pests. His father was most gracious and showed us about. They use "Loro" spray about which I was unable to find anything except that it is made in the States. Several flats of *Arthroceres mirabilis* in bud, flower, and fruit, attracted my attention. His potting soils are rich in humus. His large specimen plants were displayed in a formal garden beside his house and his outside beds were a cactophile's paradise. His Epiphyllums in a semi-shaded flat-filled cement walled enclosure were bleached and new growth was very red. Dr. Hurlburt told me that Ben is not an "orchid cactus" enthusiast because they take up too much room for the length of time they flower and make a display.

Crossed into the U.S.A. and on to Rochester, N.Y. "Reservoir Park" Conservatory has added some new succulents to the "natural bed plantings"—full sun exposure. Visited Irvin Bates, "Mayor of the town" of Oakville, N.Y., and genial visitor at the Cactus Convention; he has a well planned succulent house with usual and unusual plants that a "5 and 10" sell. His potting soil is humus, bank sand (stream washed), and gravel. He has thousands of 2½ in. pots set in soil for drainage; the results were worth the trouble—good uniform growth and excellent color.

Read up on Sodium selenate for African violets, etc. The climax is that the compound when used as a "soil spray or watering" is absorbed by the plant and poisons the insects that feed upon the plant. Guarded, but thought the treatment could be used on succulents as well. Soils so impregnated, are dangerous unless "buried deep" as selenium is highly poisonous to humans and animals alike. I shall not use it on my rare plants until I am sure. My experience with rare elements in chemical compounds is conclusive. I've gotten as fine results as I can expect with a good potting soil. Nature usually sows seeds where enough plants can adjust themselves either by choice or by fate to the conditions found. Some inherit the earth while others take what is left—here belong our cacti and succulents.

Well, I am back to January-February, 1952. Perhaps some of my plants would be disappointed that I've not mentioned them but these plants are the same as the people I know—unobtrusive, dependable, and self manageable. But like the "90 and 9" I go after the "one that is lost" and that is "The Why" of this column. The Thanksgiving Cactus, the Christmas Cactus, *Rhipsalis*, *Faucarias*, *Pleiospilops*, *Lithops*, *Echeveias*, *Crassulas*, etc., have bloomed and some resting is expected. Now that I am back to my original thesis, I can close for now, Selah.

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EDITOR'S NOTE: John started his "Cactophile's Diary" in February, 1942. Have you ever written him that you appreciate his hours of endeavor? Send him a note now and tell what you would like to see in his column in 1952. He is agreeable and enthusiastic and I know that he will like to hear from his many fans.

SOME RESULTS OF TWENTY YEARS OF CACTUS RESEARCH¹

By CURT BACKEBERG

PART IV

Complete works dealing with cacti by Curt Backeberg, 1930-1950, inclusive

1930. Neue und wenig bekannte Cereen aus dem nördlichen Südamerika. *Monatsschrift der Deutschen Kakteen-Gesellschaft*, 2: 161-167.
- 1930a. *Kakteenjagd zwischen Texas und Patagonien*. pp. 1-127. Brehm-Verlag, Berlin.
1931. *Neue Kakteen, Jagden, Arten, Kultur*. pp. 1-109. Gartenbau-Verlag Trowitzsch & Sohn, Frankfurt (Oder)-Berlin.
- 1931a. Das Kakteenvorkommen von Trinidad bis Caribisch-Kolumbien. *Monatsschrift der Deutschen Kakteen-Gesellschaft*, 3: 64-67.
- 1931b. Neue Kakteen aus neuen Gebieten. *Moller's Deutsche Gartenzeitung*, 1930 (7): 81-82.
1932. Kakteen hier und drüben. *Der Kakteen-Freund*, 1(2): 2-3, 9-12.
- 1932a. Eine stachlige Parabel. *Ibid.*, 1(4): 33-36.
- 1932b. Sämlings-Pfropfung. *Ibid.*, 1(7): 71-72.
- 1932c. Kugel-Opuntien. *Ibid.*, 1(8): 81-82.
- 1932d. Kugel-Opuntien (Fortsetzung und Schluss). *Ibid.*, 1(9): 93-95.
- 1932e. Echinocactus (Thelocactus Berg.) subterraneus Backbg. n. sp. *Ibid.*, 1(10): 110-111.
- 1932f. Neuheiten und Raritäten. *Ibid.*, 1(11): 122-125.
- 1932g. Neuheiten und Raritäten. *Ibid.*, 1(12): 131-134.
- 1932h. *Cactusjacht* (Dutch edition translated by G. D. Duursma). pp. 1-125. N.V. Uitgevers Maatschappij "Kosmos." Amsterdam.
- 1932i. Following in Dr. Rose's footsteps. *Cactus and Succulent Journal of the Cactus and Succulent Society of America*, 3(8): 130-132.
- 1932j. The objects of my travels and my theory of cactus-distribution. *Ibid.*, 3(10): 165-167.
- 1932k. Some interesting Cereus problems. *Ibid.*, 4(5): 279-280.
- 1932l. Die Ziele meiner Reisen und neue Gedanken über die mutmassliche Kakteenausbreitung. *Monatsschrift der Deutschen Kakteen-Gesellschaft*, 4: 55-61.
- 1932m. Das Celsianus-Problem. *Ibid.*, 4: 204-206.
- 1932n. Schöne Kakteenneuheiten für Zimmerkultur I. *Gartenschönheit*, (Berlin), 15(10): 238-239.
- 1932o. Schöne Kakteenneuheiten für Zimmerkultur II. *Ibid.*, 15(11): 263.
- 1932p. Schöne Kakteenneuheiten für Zimmerkultur III. *Ibid.*, 15(12): 287.
- 1932q. Kakteenschicksale. *Ibid.*, 15(11): 253-255.
- 1932r. Spherical Opuntias. *The Cactus Journal* (Great Britain), 1(1): 11.
- 1932s. Origin and migration of cacti. *Ibid.*, 1(2): 13-16.
- 1932t. Chtěli byste se mnou sgírat kaktusy? *Kaktusár*, 3(3): 24-29.
- 1932u. Komt gij mede cactussen zamelen? *Cactus, Bulletin des Cactéophiles Belges*, 2(6): 6-9 (for continuation see 1933kk).
- 1932v. *Kakteen-Preisliste 1932* (commercial catalog). pp. 1-23, privately printed.
1933. Das Rätsel der Cristate. *Der Kakteen-Freund*, 2(1): 1-3.
- 1933a. Neuheiten und Raritäten. *Ibid.*, 2(1): 6-8.
- 1933b. Das Rätsel der Cristate (Fortsetzung und Schluss). *Ibid.*, 2(2): 13-15.
- 1933c. Neuheiten und Raritäten. *Ibid.*, 2(2): 18.
- 1933d. Neuheiten u. Raritäten. *Ibid.*, 2(3): 31-32.
- 1933e. Wir finden zwei neue peruanische Arten. *Ibid.*, 2(5): 49-51.
- 1933f. Neuheiten und Raritäten. *Ibid.*, 2(5): 54.
- 1933g. Kleiner Reisebrief. *Ibid.*, 2(6): 61-64.
- 1933h. Kleiner Reisebrief. II. *Ibid.*, 2(7): 73-75.

¹Edited by E. Yale Dawson.

- 1933i. Kleiner Reisebrief. III. *Ibid.*, 2(8): 85-88.
 1933j. Neuheiten u. Raritäten. *Ibid.*, 2(8): 90-91.
 1933k. Die weisse Airampoa. *Ibid.*, 2(9): 97-99.
 1933l. Importe oder Sämling? *Ibid.*, 2(9): 99-100.
 1933m. Bericht über meine Reise 1933. *Ibid.*, 2(9): 101-102.
 1933n. Neuheiten u. Raritäten. *Ibid.*, 2(9): 103-104.
 1933o. Gegenwarts-Aufgaben. *Ibid.*, 2(10): 109-110.
 1933p. Bericht über meine Reise 1933. *Ibid.*, 2(10): 114-116.
 1933q. Neuheiten u. Raritäten. *Ibid.*, 2(10): 117.
 1933r. Lobivia wegheiana Bckbg. n. sp. *Cactus, Bulletin des Cactéophiles Belges*, 3(5): 8-9.
 1933s. Theorie und Praxis. *Der Kakteen-Freund*, 2(11): 122-124.
 1933t. Bericht über meine Reise 1933. *Ibid.*, 2(11): 128-129.
 1933u. Ueber das Behandeln der Importe. *Ibid.*, 2(12): 136-137.
 1933v. Bericht über meine Reise 1933. *Ibid.*, 2(12): 138-139.
 1933w. Genus Binghamia. *Cactus and Succulent Journal of the Cactus and Succulent Society of America*, 4(12): 387-388.
 1933x. Species of Oreocereus. *Ibid.*, 5(3): 438.
 1933y. Ueber die Kultur von Melokakteen. *Der Kakteen-Freund*, 2(1): 9-10.
 1933z. Zwei Verschollene und eine schöne Rarität. *Ibid.*, 2(11): 124.
 1933aa. Report of the 1933 Expedition. *The Cactus Journal* (Great Britan), 2(1): 3-6.
 1933bb. Report of the 1933 Expedition. *Ibid.*, 2(2): 32-34.
 1933cc. Lobivia higginsiana. *Ibid.*, 2(2): 31.
 1933dd. Binghamia-Borzicactus-Haageocereus. *Kaktusár*, 4(1): 2-4.
 1933ee. Mili přátelé, Kaktusári. *Ibid.*, 4(4): 38-41.
 1933ff. Mili přátelé, Kaktusári. *Ibid.*, 4(5): 49-51.
 1933gg. Mili přátelé, Kaktusári. *Ibid.*, 4(6): 57-59.
 1933hh. Mili přátelé, Kaktusári. *Ibid.*, 4(7): 69-74.
 1933ii. Oreocereusy. *Ibid.*, 4(5): 53-55.
 1933jj. Komt gij med Cactussen zamelen? *Cactus, Bulletin des Cactéophiles Belges*, 3(1): 13-15.
 1933kk. Recit de Voyage. *Ibid.*, 3(5): 6-9.
 1933ll. Beste Cactusvrienden. *Succulenta, Maandblad van de Nederl. Vereeniging van Vetplantenverzamelaars*, 15(6): 110-115.
 1933mm. Beste Cactusvrienden. *Ibid.*, 15(7): 129-133.
 1933nn. Best Cactusvrienden. *Ibid.*, 15(8): 145-151.
 1933oo. Beste Cactusvrienden. *Ibid.*, 15(10): 193-195.
 1933pp. Beste Cactusvrienden. *Ibid.*, 15(11): 197-201.
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 1934c. *Ibid.*, 1934-3. 8 pp. (unnumbered), privately printed.
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 1934f. *Ibid.*, 1934-6. 8 pp. (unnumbered), privately printed.
 1934g. *Ibid.*, 1934-7. 8 pp. (unnumbered), privately printed.
 1934h. *Ibid.*, 1934-8. 8 pp. (unnumbered), privately printed.
 1934i. *Ibid.*, 1934-9. 8 pp. (unnumbered), privately printed.
 1934j. *Ibid.*, 1934-10. 8 pp. (unnumbered), privately printed.
 1934k. *Ibid.*, 1934-11. 8 pp. (unnumbered), privately printed.
 1934l. *Ibid.*, 1934-12. 8 pp. (unnumbered), privately printed.
 1934m. 1934 Bildkatalog meiner schönsten Expeditionsneuheiten sowie Erst und Wiedereinführungen kostbarer Arten. pp. 1-40, privately printed.
 1934n. Die Oreocereus Arten. *Der Kakteen-Freund*, 3(2): 13-14.

- 1934o. Bericht über meine Reise 1933. *Ibid.*, 3(2): 14-15.
1934p. Bericht über meine Reise 1933. *Ibid.*, 3(3): 32-33.
1934q. Bericht über meine Reise 1933. *Ibid.*, 3(5): 54-55, photo 56.
1934r. Popisy rostlin. *Kaktusář*, 6(5): 61-67.
1934s. Proč jsem u rodu *Echinopsis* stanovil podrod *Pseudolobivia*? *Ibid.*, 6(5): 67-69.
1934t. Die *Echinopsis*-Untergattung *Pseudolobivia* und die *Pentlandii*-Gruppe der *Lobivien*. *Der Kakteen-Freund*, 3(6): 61-63.
1934u. *Neowerdermannia Vorwerckii*. *Ibid.*, 3(6): 63-64.
1934v. Bericht über meine Reise 1933. *Ibid.*, 3(6): 70.
1934w. Goldene Worte Prof. K. Schumanns. *Ibid.*, 3(7): 73.
1934x. Bericht über meine Reise 1933. *Ibid.*, 3(7): 79-80.
1934y. *Lobivia* (*Echinopsis* Br. & R.) *aurea* Bckbg. v. *elegans*. *Ibid.*, 3(8): 86-87.
1934z. Die Kakteen und unsere Zeit. *Ibid.*, 3(10): 109-113.
1934aa. Die Cereensippe: *Loxanthocerei* Bckbg. *Ibid.*, 3(11): 121-124, 125 (photo).
1934bb. Die Cereensippe: *Loxanthocerei* Bckbg. (Fortsetzung und Schluss). *Ibid.*, 3(12): 133-134.
1934cc. Noch einmal die Cristatenbildung. *Ibid.*, 3(4): 38-41.
1934dd. Wie heisst mein Kaktus? I. *Ibid.*, 3(4): 46.
1934ee. Wie heisst mein Kaktus? II. *Ibid.*, 3(5): 57-58.
1934ff. *Cristates*. *The Cactus Journal* (Great Britain), 2(4): 61-62.
1934gg. What is a *Borzicactus*. *Ibid.*, 3(2): 24-36.
1934hh. *Kretouci Neowerdermannia vorwerckii*. *Kaktusář*, 5(5): 49-50.
1934ii. *Echinocereusy*. *Ibid.*, 5(5): 104-106.
1934jj. *Gymnocalycium*. *Ibid.*, 5(9): 104-106.
1934kk. Wat is een *Borzicactus*. *Cactus, Bulletin des Cactéophiles Belges*, 4(6): 86-91.
1934ll. De Verspreiding der Cactussen in Verhouding tot haar Systematische Indee-ling. *Succulenta, Maandblad van de Nederl. Vereeniging van Vetplantenverzamelaars*, 16(8): 142-143.
1934mm. Wat is een *Borzicactus*. *Ibid.*, 16(11): 177-184.
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1935d. *Ibid.*, 1935-4. 8 pp. (unnumbered), privately printed.
1935e. *Ibid.*, 1935-5. 8 pp. (unnumbered), privately printed.
1935f. *Ibid.*, 1935-6. 8 pp. (unnumbered), privately printed.
1935g. *Ibid.*, 1935-7. 8 pp. (unnumbered), privately printed.
1935h. *Ibid.*, 1935-8. 8 pp. (unnumbered), privately printed.
1935i. *Ibid.*, 1935-9. 8 pp. (unnumbered), privately printed.
1935j. *Ibid.*, 1935-10. 8 pp. (unnumbered), privately printed.
1935k. *Ibid.*, 1935-11. 8 pp. (unnumbered), privately printed.
1935l. *Ibid.*, 1935-12. 8 pp. (unnumbered), privately printed.
1935m. *Solisia* und *Pelecypora*. *Kakteenkunde*, 5: 98-101.
1935n. Ein neuer *Roseocactus*: *Roseocactus* (*Ariocarpus*) *Kotschoubeyanus* v. *albiflorus* Bckbg. n. v. (und über *M. Herrerae* v. *albiflora* und *M. microhelix* bezw. *microheliopsis*). *Der Kakteen-Freund*, 4(6): 66-67.
1935o. Zum Artikel "Ein offenes Wort über die Nomenklatur." *Ibid.*, 4(4): 39-40.
1935p. Einigung. *Ibid.*, 4(4): 49.
1935q. Die Gattung *Parodia*. *Ibid.*, 4(5): 50-52.
1935r. Beobachtung zur Frage der Blütenentstehung: Absonderliche Stachel-, Blüten- und Fruchtbildungen. *Jahrbuch der Deutschen Kakteen-Gesellschaft in der Deutschen Gesellschaft für Gartenkultur*, 1: 33-40.
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1935t. Pflanzen und Blumen. *Ibid.*, 1935: 206-208.
1935u. Rod *Opuntia* a jeho podrody. *Kaktusář*, 6(3): 34-36.
1935v. Rod *Opuntia* a jeho podrody. *Ibid.*, 6(4): 42-45.

- 1935w. Rod *Opuntia* a jeho podrody. *Ibid.*, 6(5): 50-51.
 1935x. Rod *Opuntia* a jeho podrody. *Ibid.*, 6(6): 66-68.
 1935y. Rod *Opuntia* a jeho podrody. *Ibid.*, 6(7): 81-82.
 1935z. Rod *Austrocactus*. *Ibid.*, 6(1): 4-7.
 1935aa. Vzácné *Lobivie*. *Ibid.*, 6(10): 11-13.
 1935bb. K fotografiím. *Ibid.*, 6(10): 113-114.
 1935cc. Felicitations et Souhais. *Cactus, Bulletin des Cactéophiles Belges*, 5(6): 87-90.
 1935dd. De Cactussen op de Eilandengroep van Curacao. *Succulenta, Maandblad van de Nederl. Vereeniging van Vetplantenverzamelaars*, 17(4): 55-57.
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 1936d. *Ibid.*, 1936-4. 8 pp. (unnumbered), privately printed.
 1936e. *Ibid.*, 1936-5. 8 pp. (unnumbered), privately printed.
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 1936l. *Ibid.*, 1936-12. 8 pp. (unnumbered), privately printed.
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 1936n. *Haageocereus australis* Bckbg. n. sp. *Ibid.*, 1: 104.
 1936o. *Lobivia tegleriana*. *Ibid.*, 1: 82.
 1936p. Untersuchungen über monotypische Gattungen unter den südamerikanischen Cereae. *Ibid.*, 1: 111-120.
 1936q. Das Rätsel der Gattung *Monvillea*. *Ibid.*, 1: 121-125.
 1936r. Zur Kenntnis der Gattungen *Lobivia* und *Echinopsis*. *Ibid.*, 1: 129-131.
 1936s. *Arequipa Weingartiana* Bckbg. n. sp. *Kaktusář*, 7(6): 61-66.
 1936t. My fifth South American expedition (concerning the future of cactology). *Cactus and Succulent Journal of the Cactus and Succulent Society of America*, 8(5): 73-75.
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FIG. 100. The variegated form of *Agave americana* makes a decorative pot plant.

SUCCULENTS OTHER THAN CACTI

By W. CLARK

Without a doubt the easiest plants to grow in a window garden are the succulents, for they can better withstand the unequal temperature and moisture conditions that so often prevail in a living-room and especially the hot, dry air. Cacti are only a small portion of the great army

of desert plants which are best adapted to withstand great irregularities in the moisture supply. Roughly speaking, the other succulents are generally cheaper than cacti, easier to grow, more compact, freer from spines, quicker and surer to bloom, and some of them are handsome in

flower. Where the flowers are insignificant the growth is usually interesting. Obviously these succulents are very desirable for people who can care for plants only at irregular intervals.

While the cacti are interesting because of their many curious forms, with few exceptions they seldom give the owner many flowers—they have no lasting qualities. Just as many curiously shaped plants can be found among the other succulents and some of them have more or less showy flowers which last for a week or more.

CENTURY PLANTS

Probably the most talked-of succulent plant is the so-called Century Plant (*Agave americana*). It derives its name from the supposition that it blooms but once in a century. It seldom does bloom in cultivation, but that is because of insufficient pot room which cramps the roots and supplies a meagre amount of plant food. Under favorable pot conditions the Century Plant has been made to flower in something like twenty years. To accomplish this an abundance of plant food and water were supplied. Although this, as well as all the other Agaves, come from the arid portions of Mexico where there is a strenuous struggle for existence, they will promptly respond to good treatment.

The Century Plant is very useful to the amateur. If he does not care for it in the living-room during the winter it can be grown in a tub and set on or in the lawn during the summer and stored during the cool months of the year, in a rather light but frost-proof cellar. Stored thus, it will require but little water during the winter.

Small plants can be grown all winter in the living-room, and when warm weather comes they may be used for porch decorations. The

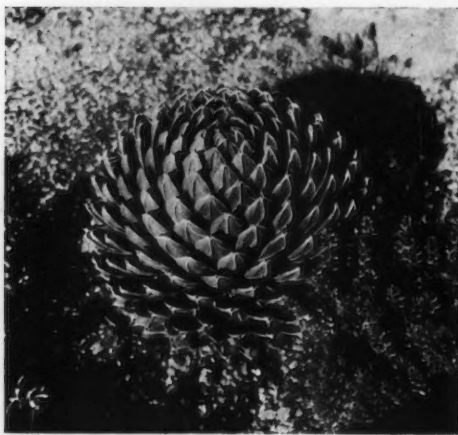


FIG. 101. *Agave Victoria-Reginae*.



FIG. 102. One of the most popular succulents is *Aloe variegata*.

Century Plants are well adapted for this because of their symmetrical habit. A large Century Plant will have forty or fifty fleshy leaves each about three or four feet long and three to four inches across, which gradually taper to a point that is tipped with a very sharp spine; the edges also have a few short spines. They form a large rosette which sets on the ground. The leaves are of a light glaucous green color in the type, but there are several varieties; some have a more or less broad yellow strip down through the center of the leaf, while in others the leaves are edged with yellow.

Should you be so fortunate as to have a plant flower, do not be surprised that it dies as soon as the seeds mature. It always does this, but the plant may be perpetuated by the numerous suckers found about the base of the plant.

The flowers are borne in clusters at the top of a tall stout stem and have a weird candelabra-like effect.

There are about 300 different species of Agaves, varying in the size and shape of the leaves, but there is not enough difference between them to pay anyone but a botanist to grow a large collection of them. The only exception to this is the beautiful Queen Victoria Century Plant (*Agave Victoriae-Reginae*). The leaves of this are short and thick—so thick that sometimes they appear to be three-sided—with three more or less well-defined edges, having white filaments. The ends of the leaves are blunt but tipped with a short black spine. So closely together and so regularly are the leaves set that they form a hemispherical mass. Where the room is limited, this is the best one to grow.

Give Century Plants a sandy soil and pot them firmly. If they are planted outdoors during the



FIG. 103. *Othonna crassifolia* makes a fine plant for hanging pots.

summer, be sure they are in a sufficiently large pot so that when taken up in the fall they will not need repotting.

THE ALOES

Next to Century Plants I believe that the Aloes are the most interesting. Although there are a large number of species, only a few are in general cultivation, the most common of which is the Barbadoes Aloe (*Aloe vera*). Strange as it may seem it belongs to the same family as our beautiful Easter Lily. The light green leaves are very thick and fleshy and taper gradually to a point which is not tipped with a spine. At a distance the edges look as if they were set with spines, but one is agreeably surprised to find that it is a suggestion only. In the late winter months a flower stem about one and a half or two feet long is produced which bears at its top a conical-shaped cluster of yellow flowers which reminds one of the flower cluster of the red-hot poker plant (*Kniphofia*), a close relative. The individual flowers are about one and one-quarter inches long, yellow, and crowded closely together. A single flower lasts only a day or two, but the lower ones open first while the buds of the upper ones are still forming so that one plant will be in flower for a fortnight, or so.

If you want a red-flowered Aloe grow *A. variegata*.

These Aloes have one bad habit: when they begin to become of any size they get top-heavy. To overcome this for several years stake them. If the plant becomes too big for the window garden and yet you do not wish to dispose of it, use it outdoors during the summer and store it in the cellar over winter as suggested for Century Plants. Under this treatment, however, flowers are the exception.

The Aloes prefer a richer soil than most of the succulents. I have seen them thriving when grown in nothing but garden loam, but I prefer to give them a soil made up of about three parts sandy loam, and one part of old plaster and broken bricks. A little well-decayed manure may also be added with benefit.

OTHONNA—A GOOD BASKET PLANT

The best succulent for a hanging basket is "little pickles" (*Othonna crassifolia*). Its leaves are shaped like cucumber pickles, but are only an inch or less long. The flowers are yellow, one-half to three-quarters of an inch across and look like dandelion flowers. They only open in the sun but at almost any season of the year each shoot has a flower stalk on the end of it. Little pickles may be increased easily by planting pieces of the stems.

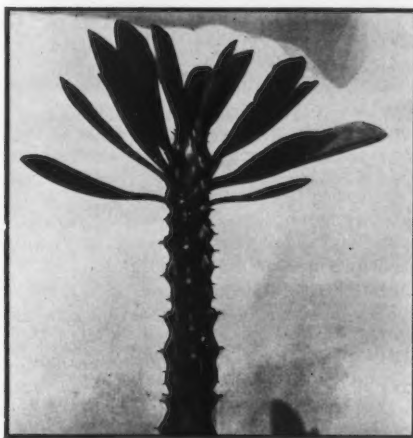


FIG. 104. *Euphorbia neriiifolia*.



FIG. 105. The easiest plant in the world to propagate is *Bryophyllum Diagremonianum*. Note the three generations. (Swingle in Jour. Heredity.)

GROTESQUE EUPHORBIAS

For something grotesque, grow one of the Euphorbias, and it does not make much difference which one of the fleshy kinds it is. The stems are green, fleshy and three- or four-angled. Some kinds, like *E. neriifolia*, have a good crop of leaves; others have but few, in which case they look like bare poles, and some have no leaves at all and are very spiny, so much so that you look a second time to see whether they do not belong to the *Cereus* tribe of cacti.

The Crown of Thorns (*Euphorbia splen-*

dens), is covered with short, stout, sharp spines. The young growth is always covered with leaves and the bright red bracts, surrounding the flowers, are in evidence most of the year. In order to keep the plant within bounds it must be trained on a form.

THE OLD-FASHIONED "AIR PLANT"

If you want something interesting to show your friends, grow the so-called Air Plant (*Bryophyllum pinnatum*). The plant itself has no decorative value, but it blooms about once a year. The flowers are reddish-green with white spots, are about two inches long and are borne in clusters. The curious thing about this plant is that if a leaf is laid on a damp surface it will produce a new plant at each indentation. I have seen leaves pinned to a wall or window casing in the house, produce four or five new plants.



FIG. 105a. *Bryophyllum pinnatum*.

APICRA, HAWORTHIA, GASTERIA

The Apicras, Haworthias, and Gasterias have curiously shaped leaves. Those of the latter are usually strap- or tongue-shaped, four to six inches long, dark green in color, and covered more or less, with small white spots. In many of the Gasterias the leaves are produced in two ranks one above the other. In April and May, and sometimes later in the season, a long flower spike is produced on which are scattering red flowers, which are rather interesting but do not make much of a show unless one has a number of plants in flower at the same time, in which case, mass them.

The Apicras and Haworthias have short leaves, one and a half inches long, roundish, taper to a point and are arranged in a spiral around a central axis which sometimes is three or four inches tall.

NOTE: Next issue will discuss Fig Marigolds, Echeverias, Sedums, Houseleeks. (From "The Garden Magazine, 1907").

YUCCA SEEDS WANTED

Would appreciate receiving Yucca seeds of all known species collected from wild plants in any of the 48 States and Mexico in which Yuccas are native. Names of species preferred but not necessary if locality where collected is given.

Having considerable area available in the foothills, attempts will be made to naturalize all species received. Postage will be gladly refunded.

GEORGE G. GLADE

7600 Verdugo Crestline Dr. Tujunga, California.

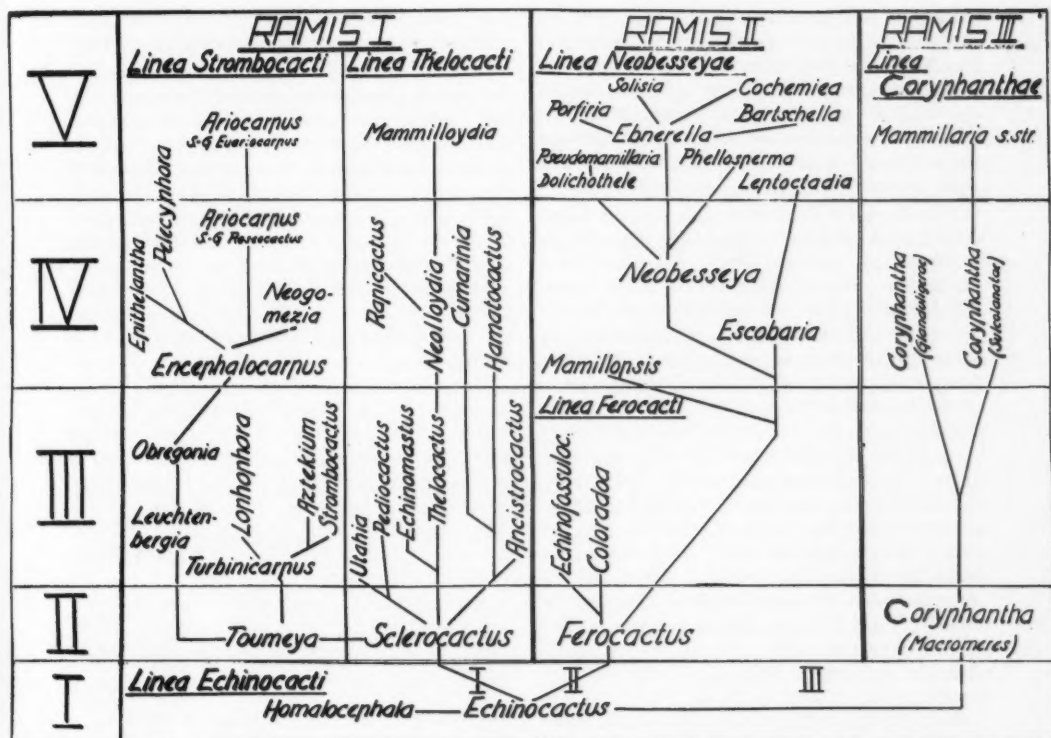


FIG. 106. Phylogeny of the Euechinocactineae F. Buxb. The three main branches, Ramis I (Strombocacti and Thelocacti), Ramis II (Ferocacti and Neobesseyae), and Ramis III (Coryphanthae). All, after being derived from the primordial stage (No. I) of the group Echinocacti, pass through the same four developmental stages: No. II, connecting stage; No. III, transitory stage; No. IV, Coryphantha-stage; No. V, Mammillaria-stage.

Stages and Lines of Evolution of the Tribe Euechinocactineae*

By FRANZ BUXBAUM, Judenburg, Austria

Former attempts to outline the phylogeny of cacti have for the most part failed because these systems, and the genera within them, were established without exact descriptions or morphological knowledge of the flowers, fruits, and seeds. Also knowledge of the dynamic morphology of developmental stages has been quite insufficient. More correctly, the dynamic morphology of cacti follows definite laws of evolution, and the extremely varied growth habit is a result of only a few lines of development. A. Berger and later authors recognized that the gradual loss of the axial nature of the flower tube, that is, the loss of areoles, is characteristic of a line of development, but they did not recognize that this loss of axial nature is not char-

acteristic of a certain stage of evolution, a stage which appears in many parallel lines of evolution. Because this was not recognized many genera of the same degree or stage of evolution were assumed to be close relatives, and those genera which are closely related but which are of different stages of evolution were considered to be widely separated and distant relatives.

Because of these fallacies I began a study of cactus morphology with the aim of finding the morphological types of the whole family. With this knowledge it should then be possible to examine the evolution of first small, and later large groups of the family, all this ultimately culminating in a true phylogenetic system.

The first tribes which I was able to elaborate in this way were the North American Echinocactanae (except *Astrophytum* which does not

*Edited by E. B. Kurtz, Kerckhoff Labs. of Biology, Calif. Inst. of Tech., Pasadena 4, Calif.

belong in this group), and the former Coryphanthanae. These tribes have now been combined into the new tribe Euechinocactineae F. Buxb., and it is the purpose at this time to present a short discussion of this new tribe. The original descriptions and diagnoses of the new and emended genera may be found in the *Osterreichische Botanische Zeitschrift*, 1951.

All members of the Euechinocactineae originated from a common "primordial" stage (Stage I, Fig. 106), the primitive Linea Echinocacti which contains the recent genera *Echinocactus* and *Homalocephala*. *Echinocactus* mainly contains giant species, but in a few the tendency to remain small is already recognizable. This tendency follows the general "Law of Abbreviation of the Vegetative Stage." The podaria¹ in this evolutionary line still unite into ribs; the flowers have the character of a stem joint because they are massive and bear many scales with woolly and hairy areoles; the seeds still have a glossy, smooth, rather hard testa (except in *Echinocactus horizontalis* and *E. polycephalus* which have verrucose (rough) testas, and *E. xeranthemoides* in which the testa is finely reticulate); the hilum is of medium size and is slightly depressed; near the hilum is a small pore, the micropyle, through which the root emerges; the embryo is large, more or less curved and the cotyledons are quite large; and next to the embryo is a large perisperm.

From this primordial stage the phylogeny branches into three groups (Ramis I, II, III), each of which parallels the others and passes through the same stages of evolution. Before going further, it may be well to describe these stages.

Stages of Evolution

The genera of the "connecting" stage (No. II) still have quite different characteristics because only a few of the common laws of development have become manifest. This is quite characteristic of very primitive "connecting" genera, even of other plant families. This stage is generally characterized by very primitive flowers which still possess areoles, occasionally with wool. In *Ferocactus*, which is still very close to *Echinocactus* as indicated by the shape of the plant, the scales of the flower have naked axils. But even so, in *Ferocactus bamaeacanthus* I have observed some areole-hairs in the throat between the innermost perianth segments and the stamens. Except in Ramis III, Linea Coryphanthae, which passes from Stage II to IV without pass-

ing through Stage III, the flowers of the "connecting" stage arise close to the spiny areole.

In the "transitory" stage (No. III) the podaria become so greatly separated that the ribs gradually become more or less divided into tubercles. In *Echinofossulocactus* this separation results in each rib bearing only a few areoles. Because of the loss of ribs the plant remains in a juvenile habit. The serial division of the growing point of the areole occurs very late, and therefore the flower arises close to the spiny part of the areole. The scales of the flower in the "transitory" stage never bear any axillary wool, and sometimes the pericarpel ("ovary") is even naked or scaleless.

The next stage, Number IV, I call the "Coryphantha stage" because in all the lines of evolution the tubercles have a more or less distinct groove or furrow on the upper surface. This is caused by an early serial division of the areole growing point, generally while the young tubercle is elongating. The two parts of the tubercle, the spiny areole and the growing point of the flower or lateral branch, thus remain connected by the furrow. The flower in this stage of evolution approaches the shape and form of a *Mammillaria* flower because the tube is rather petaloid (colored) and sometimes also scaleless.

The fifth stage is termed the "Mammillaria stage" because the plant and flower shape have the habit of this genus. In this stage the flower in all developmental lines attains the highest degree of simplification (reduction), for it remains small and contains only a few stamens. The serial division of the areole growing point takes place when the young tubercle is just a meristematic primordium. This division therefore results in the spiny areole and the axillary growing point being separated without any connecting groove.

In several lines of evolution the most evolved genera have milky sap. In only one genus, *Cocheminea* (Ramis II), is the flower zygomorphic.

Again I repeat, these are only stages of evolution which occur in every branch of the phylogenetic tree, not only in the Euechinocactineae, but also in several other groups of the family. Therefore the genera of the same stage are related only if they belong to the same line of evolution. Former workers have overlooked this fact, and therefore they have assumed genera of the same stage of evolution to be closely related, and this has often resulted in plants of different origin, but of the same degree of development, being placed in the same genus.

Lines of Evolution

Any plant character which is to be used to dis-

¹For a complete discussion, with figures, of the terms used see: F. Buxbaum, *Morphology of Cacti*, Section I. Roots and Stems. 87 pages, Abbey Garden Press, 1950.

tinguish different phylogenetic lines must have the following qualities:

1. It must not follow a general tendency of development which occurs in all or in many branches of the phylogenetic tree.

2. It must have many different morphological types, such that they cannot grade into one another.

3. It must remain constant for the whole line of evolution.

The inner and outer shapes of the seed were found to satisfy these requirements. However, to follow such characteristics of the seed one must first determine the characteristics of the most primitive cactus seed. This is the seed of *Pereskia sacharosa* which still greatly resembles the seed of any *Phytolacca*, especially as to inner characteristics.

The seed coat (testa) of *P. sacharosa* is smooth and glossy. The outer walls of the cells are equally thickened and flat. The black pigment is very resistant and can be only bleached with 30 per cent hydrogen peroxide after several weeks. Immature and partly bleached seeds are generally brown. The embryo is slender, curved nearly into a circle, and the large cotyledons are only slightly succulent. A large perisperm is also present. In accordance with this seed type, the following characteristics may be taken as primitive for any cactus seed:

1. Glossy, hard, and smooth testa with flat outer cell walls.

2. Elongate, more or less slender embryo.

3. Well-developed cotyledons.

4. Presence of perisperm. This tissue gradually becomes lost in the phylogenetic development, but once lost in any line it can never occur again in a more highly developed genus of the same line.

All these characteristics are realized, as we have seen, in the primitive *Linea Echinocacti*. Also on the basis of the flower and the whole habit this line is undoubtedly the most primitive of the tribe. The testa of *Echinocactus horizontalis*, and, according to the literature, also that of *E. polycephalus*, is already verrucose. Thus these species lead to the first progressive branch of the tribe, Ramis I.

Ramis I is characterized by a verrucose testa. Only two rather primitive species, *Hamatocactus uncinatus* and *H. crassispinus* (both formerly *Ferocactus* and placed by Backeberg in his genus *Glandulicactus*), still have a rather smooth testa. In the highest species of *Linea Thelocacti*, *Mammilloidya* (formerly *Mammillaria*) *ortiz-rubiana*, the bumps of the testa become flat again and the seed appears to be glossy. Nevertheless, in between the round smooth bumps are some

small spots. These spots have caused the seed to be described as "pitted in rows," but of course in pitted seeds the outer cell walls are concave. These intervals between cells will be termed "spots," and the seed is thus spotted. This progression also occurs in other groups of cacti, for instance, in the *Trichocerei* and some *Hylocerei*.

The second branch, Ramis II, has only one species with a smooth testa, *Ferocactus echidne*. All other species have strongly thickened radial cell walls in the testa, whereas the outer cell walls are thin and therefore shrink into the mature dry seed. Thus the outer texture of the seed is first lattice-like, if the radial walls are not yet very thick, as in *Ferocactus*, *Echinofossulocactus*, and probably *Coloradoa*. In the more advanced genera and species the testa is definitely pitted, and if the cells of the testa are very large the testa becomes very deeply pitted.

In Ramis III the tendency toward reduction of the vegetative period is so advanced, even in Stage II, that only the juvenile habit of tubercles remains definite. The testa of the seed remains tender with unthickened and brown cell walls, just as in the immature seeds of other cacti. These characteristics remain typical for the whole branch.

These three types of testa structure are absolutely distinct, and each can only be derived from a common primordial line. A transition from one to another type is impossible even in the most highly evolved genera. Because these three branches all have the same origin, they must also pass through the same stages of development. Therefore genera in the three branches which have very similar appearance must have been evolved along parallel lines. To distinguish these parallel lines one must use the testa characters, which are constant and distinct in each branch.

When testa characters and all others are used, including geographical distribution, the following lines of gradual progression may be determined (Fig. 1).

Ramis I. Linea Strombocacti

I agree with W. Taylor Marshall that *Ariocarpus* and *Roseocactus* must be made subgenera of *Ariocarpus*, but it is impossible to also combine *Encephalocarpus*. The latter genus is very important as a connecting link from *Obregonia* to *Epithelantha* because it has the same clavate spines at the tip as in *Epithelantha*. These glandular spines have only been observed in the two genera *Epithelantha* and *Encephalocarpus*. Therefore this monotypic genus must be preserved.

Strombocactus disciformis—the only true *Strombocactus*—and *Aztekium* form a separate

lateral evolution, as characterized by the large arillus of the seed. *Turbinicarpus*, which differs from *Toumeyia* because it possesses a highly advanced flower with a naked pericarpel and a petaloid tube, must be separated again. Perhaps *Navajoa croiz*, which I know only from descriptions, belongs to *Turbinicarpus* also.

Linea Thelocacti

This line divides at the base from *Sclerocactus* into one main and two lateral lines. The main line contains *Thelocactus*, *Echinomastus*, *Neolloydia* (including Backeberg's *Gymnocactus*), *Rapicactus*, and ends with the new genus *Mammilloidia* in Stage V. *Rapicactus* is very closely related to *Neolloydia*, but it has such aberrant characters that it must be made a separate genus.

From *Neolloydia* develops *Mammilloidia* with *Neo. beguinii* at one end and *Mam. candida* at the other. The seeds of these two genera can hardly be distinguished. One lateral line contains the genera *Utahia* and *Pediocactus*, but this is not sufficiently proved as yet because I have been unable to examine these plants directly. The second lateral branch is characterized by hooked spines. It contains the genera *Ancistrocactus* at one side and *Hamatocactus* and *Cumarinia* at the other. *Cumarinia* is the former *Coryphantha odorata* Boed., which was later put into *Neolloydia*, but it certainly belongs to neither of these genera. *Hamatocactus* now contains the three species *H. setispinus*, *H. crassispinus*, and *H. uncinatus* (formerly *Ferocactus*). Thus Backeberg's *Glandulicactus* is a synonym of *Hamatocactus*. Contrary to W. T. Marshall's opinion, *Echinocactus hamatacanthus* is a true species of *Ferocactus* because it has the same seed structure, a type which never occurs in Ramis I. Also it has the same succession of spine development and a very solid, short receptacle ("tube") which bears areole hairs within the throat. This is as it occurs in *Brasiliopuntia*, *Pereskia sacharosa*, *Tacinga*, and also, as I have recently found, in *Leuchlenbergia*.

This *Hamatocactus* line also reaches the Mammillaria-stage (V), but since I have not examined the flowers of the plants belonging here, no complete diagnosis can be made at this time.

Ramis II

This branch is particularly interesting because the Mammillaria-stage is attained several times in different lateral lines of evolution.

Linea Ferocacti

This group is the more primitive branch and connects the genera of the advanced Linea Neobesseyae with the primitive Echinocacti. Linea Ferocacti contains *Ferocactus*, *Echinofossulocactus*, and *Coloradoa*, which appears to be closely related to *Echinofossulocactus*.

Linea Neobesseyae

This is the advanced part of Ramis II and is connected to *Ferocactus* by the genus *Escobaria*. The latter genus has been enlarged to include the new subgenus *Pseudocoryphantha* which contains those former species of *Coryphantha* that have pitted seeds and ciliate outer perianth segments. Thus this primitive subgenus of *Escobaria* contains the following species: *E. chlorantha*, *E. vivipara*, *E. neomexicana*, *E. arizonica*, *E. deserti*, *E. aggregata*, *E. hesteri*, and *E. oklahomensis*. The genus *Escobaria* may now be clearly characterized by its pitted seeds with a large perisperm.

The subgenus *Pseudocoryphantha* leads directly to *Neobesseyia*. This genus has lost the perisperm but does form a white arillus on the seed. The connecting links are *Escobaria vivipara* and *Neobesseyia missouriensis*.

The subgenus *Enescobaria*, which contains the earlier species of *Escobaria*, continues into the Mammillaria-stage in the new genus *Leptocladia*. This genus contains the former *Mammillaria leona*, *M. microbiliopsis*, *M. microbelia*, *M. echinaria*, *M. elongata viperina*, and *M. mieheana*. *Leptocladia* differs from *Mammillaria* (in the strict sense) because it has pitted seeds. Such seeds never occur in Ramis III, which contains the true Mammillarias. *Leptocladia* differs from *Ebnerella* because the former has a perisperm and has lost the black coloration of the seed.

From *Neobesseyia* three lines of development occur. The first leads to *Dolichothele* (connected to *Neobesseyia* by *N. wissmannii*) and continues into the Mammillaria-stage (V) with *Pseudomammillaria* gen. nov. This new genus contains the former *Mammillaria pseudomammillaris*, *M. decipiens*, *M. albicans*, and *M. camptotricha*.

Neobesseyia develops two other lines, one with an arillus and the other without. Probably the latter developed before the former.

The arillus-bearing line consists of the genus *Phellosperma*, but in an extended sense. It now contains also those "Mammillarias" which have a long flower tube. This is the group which Backeberg designated as the genus *Krainzia*, but which now must only be taken as a subgenus of *Phellosperma*. Here belong *P. longiflora* and *P. guelzowiana*. The second subgenus, *Euphellosperma*, has already developed small flowers similar to those of *Mammillaria* in appearance, and also it has a very long arillus. This subgenus therefore contains *P. tetrancistra* and *P. pennispinosa*. The arillus enlarges the more the flower is reduced to the Mammillaria-habit.

The line which has not been well-developed leads directly from *Neobesseyia* to the new genus *Ebnerella*. The connecting species is *E. zephyranthoides*, the seeds of which closely resemble those of *Neobesseyia* except that no arillus is formed. The genus *Ebnerella* begins with species which have a very large flower with acuminate perianth segments. Thus we see that this subgenus (*Archebnerella*) develops not from *Phellosperma* subgen. *Krainzia*, but rather it only parallels this, although the genera are rather closely related. *Ebnerella* contains all former "Mammillarias" which have seeds that are pitted, black, and without perisperm or arillus. In this genus most of the species have hooked central spines, but some have straight central spines, and finally there are those which have lost all central spines. All these forms are clearly related, however.

In *Ebnerella reko* this line reaches a stage with semi-milky sap. This is of interest because the line continues with the genera *Solisia* and *Porfiria* which have milky sap.

Another descendant of *Ebnerella* is the genus *Bartschella*. This genus has a fruit which resembles a berry but is really a very dry capsule which dehisces along a circular fracture, as in a capsule of *Rebutia*.

Finally *Cochemiea* originates from the western species of *Ebnerella*, such as *E. capensis*.

Thus the genus *Ebnerella* is a true cardinal point in this line of evolution.

Ramis III. Linea Coryphanthae

The third branch which originates directly from the Echinocacti now contains only the two revised genera *Coryphantha* and *Mammillaria*, in the strict sense.

Backeberg's *Lepidocoryphantha*, that is, Britton and Rose's Series *Macromeres*, is the most primitive stage of the genus *Coryphantha*, and it continues directly to the more highly developed *Coryphanthas*. Thus the genus *Lepidocoryphantha* is of little use and only interrupts a clear line of development. It has therefore been included in the genus *Coryphantha*, as W. T. Marshall has already done. The true *Mammillarias* continue directly from *Coryphantha* in Stage V.

In summary, this rather large tribe may now be more clearly arranged phylogenetically as follows:

FAMILY—Cactaceae

SUBFAMILY—Cereoideae

TRIBUS—Euechinocactinae F. Buxb.

LINEA PRIMITIVA—Echinocacti. F. Buxb.

1. *Echinocactus* Link & Otto
2. *Homalocephala* Br. & R.

RAMIS I

Linea Thelocacti F. Buxb.

3. *Sclerocactus* Br. & R.
4. *Pediocactus* Br. & R.
5. *Utahia* Br. & R.
6. *Ancistrocactus* Br. & R.
7. *Hamatocactus* Br. & R. (including *Glandulicactus* Backbg.)
8. *Cumarinia* (Knuth) F. Buxb.
9. *Echinomastus* Br. & R.
10. *Thelocactus* (K. Schum.) Br. & R.
11. *Neolloydia* Br. & R. (including *Gymnocactus* Backb.)
12. *Rapicactus* F. Buxb. & Oehme
13. *Mammilloidya* F. Buxb.

Linea Strombocacti F. Buxb.

14. *Toumeyia* Br. & R.
15. *Turbinicarpus* F. Buxb. & Backb.
16. *Lophophora* Coulter
17. *Strombocactus* (Br. & R.) emend. F. Buxb.
18. *Aztekium* Boedeker
19. *Leuchtenbergia* Hooker
20. *Obregonia* Fric
21. *Encephalocarpus* A. Berger
22. *Ariocarpus* Scheidw. (including *Roseocactus* A. Berger)
23. *Neogomezia* Castaneda
24. *Epithelantha* Weber
25. *Pelecyphora* Ehrenb.

RAMIS II

Linea Ferocacti F. Buxb.

26. *Ferocactus* Br. & R.
27. *Echinofossulocactus* Lawrence
28. *Coloradodoa* Boissév. & Davids.

Linea Neobesseyae F. Buxb.

29. *Escobaria* (Br. & R.) emend. F. Buxb.
30. *Leptocladia* F. Buxb.
31. *Mamilloopsis* Weber
32. *Neobesseyia* Br. & R.
33. *Dolichobele* (K. Schum.) Br. & R.
34. *Pseudomammillaria* F. Buxb.
35. *Phellosperma* (Br. & R.) emend. F. Buxb.
36. *Ebnerella* F. Buxb.
37. *Cochemiea* (K. Brandeg.) Walton
38. *Bartschella* Br. & R.
39. *Porfiria* Boedeker
40. *Solisia* Br. & R.

RAMIS III

Linea Coryphanthae F. Buxb. emend.

41. *Coryphantha* (Lemaire) emend. F. Buxb. (including *Lepidocoryphantha* Backb.)
42. *Mammillaria* (Haworth) emend. F. Buxb.



QUESTIONS and ANSWERS

Conducted by
HARRY JOHNSON
Paramount, Calif.

Notes on Feeding Cacti in the north. "In our northern climate, of long winters and little sunshine, any kind of plant food should be withheld starting in early August. This gives the plants more time to go dormant. There are only about 200 days of sunshine. For Cacti and Succulents there are only about two and one half months—from May 15th to August 1st when outside conditions are suitable for growing." John Haag, Minnesota. Mr. Haag has had much experience in growing cacti in the north and his suggestions deserve much attention by those similarly situated.

LETTER FROM HARRY JOHNSON

Had a pleasant trip down to Ecuador. Left Tijuana and went to Mazatlan then over to Guadalajara and Mexico City. Next morning to Guatemala, San Salvador, Nicaragua and arrived in Panama about 10:00 p.m. Stayed at the Hotel Panama as the old Tivoli is closed. The Panama is about the last thing in modern hotels. Went out to old Panama City and found what may be *Deamia testudo* or perhaps *Hylocereus*. Arrived in Guayaquil at 4:15 a.m. but there is not much for a plantsman here. Saw one *Combretum* with crimson flowers that looked interesting. Arrived in Quito about noon and hunted up the old hotel where I stayed before. I came to see Dr. Acosta Solis the government botanist. We went out to the Equatorial Monument to see the cacti along the way. *Opuntia cylindrica* grows all about Quito. It is somewhat different from our commercial plant. There were two other platyopuntias which I had identified before but have forgotten at the moment. *Borzicactus Ventimiglia* is native near the Monument. So far as I can see it is a long spined form of *B. sepium*. The Borzis look very different in the field to our home grown products. I have visited all the nurseries in town. From our standpoint, of course, they are hardly nurseries. Mostly Rex Begonias, Coleus, some Cinerarias, etc. Strangely there were some Haworthias, one lone *Gasteria*, a *Chamaecereus* and *Echinopsis multiplex* together with *Aeonium Cooperi*, *Stapelia variegata* and *S. gigantea*, some Xmas cacti, *Bryophyllum Daigremontianum* and *B. tubiflorum*.

Tomorrow I am going down to Baños and Puyo on the Rio Pastaza. These are the last towns on the way to the lower Amazon affluents. Dr. Solis kindly lent me his best native collector who is now making the arrangements. It will take about 4 days. Manuel Guillar has collected with most of the American botanists. He was with Dr. Wiggins on his last trip. Am going down to collect a beautiful *Maranta* I found here in 1948. There is also a fine new *Anthurium* here. Also, of course, there are lots of Bromeliads. In 1948 I found some beautiful Melastomads. One was a tree about 15 feet tall covered with 18 inch panicles of 2 inch royal purple blossoms. Magnificent. We will have to use ropes to get down to the Anthur-

ium if we locate it as it is hanging on the cliffs in the gorge of the Rio Pastaza near the glorious falls of Agoyan. The Orchids are splendid and if we are lucky will see tens of thousands of *Sobralias* in bloom.

On Monday the Ministerio de Economia is giving me a station wagon and driver and Manuel Guillar to go to Santo Domingo de los Colorados on a two day collecting trip. I was there in '48. This is truly the most spectacular journey I ever made. Millions of *Sobralias* were in bloom—the flowers as big and lovely as *Cattleyas*. One *Pitcairnea* I found had a 4 inch spike of brilliant red blossoms, even the rachis and bracts were of the same bright red. I also found *Selenipedium caudatum* with 8 inch drooping spiralled petals. I saw no cacti below 7000 feet. You are right on the Equator here and the jungles are amongst the finest in the world. One also is near the 22,000 ft. peaks of Chimborazo, Altar, etc., covered with their snow caps and glaciers like giant vanilla ice-cream cones.

On Wednesday I am flying back to Guayaquil and then flying up to Cuenca in Southern Ecuador. Most of the cacti will be found from Cuenca south to the Peruvian border as the country grows much drier. I won't have time to do much more than give it a once over as I am flying to Lima on Friday.

In Lima I expect to meet with Dr. Vargas who will accompany me through Peru if we can make the arrangements with the University of Cuzco for a leave of absence. We expect to cover the northern part of Peru and east to Bagua on the Marañon. This is considerably farther than most collectors recently have gone.

Quito, Ecuador
September 26, 1951

Editor Cactus Journal:

As you know, I will be here at the Bailey Hortorium for a year helping with the revision of *Hortus*, a dictionary of gardening and cultivated plants. I am particularly concerned at the moment with the various groups of succulents. Since *Hortus* aims to treat all plants grown in this country (aside from those found only in large botanic gardens), we should rather like to know what plants are grown in this country. Anyone specializing in a particular group of succulents (or other plants) can help to bring the treatment of that group up to date if he will read the treatment of the group in *Hortus Second* and send me suggestions. I'll be interested to learn of any errors or of any plants now in cultivation that were omitted before.

In order to verify names, the Hortorium would be glad to receive either fresh or dried specimens of any species omitted from *Hortus Second*. These should be as complete as possible, that is, with flowers and fruit, if available, as well as vegetative parts. And they should be accompanied by information as complete as possible as to their origin. Even without specimens, however, a list of omissions would be helpful.

Since it is largely through dealers' lists and catalogs that the Hortorium keeps track of new introductions, we should greatly appreciate being placed permanently on the mailing list of any dealer.

REID MORAN

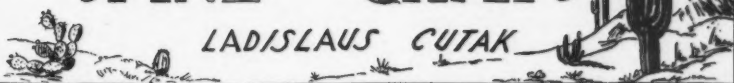
Bailey Hortorium, Ithaca, New York.

EDITOR'S NOTE: Let's get behind this worthwhile publication so that our particular plants will be fully verified and completely listed. Write to Society Member, Reid Moran now.



SPINE CHATS

LADISLAUS CUTAK



A destructive disease of sisal was found in Venezuela in 1948. The disease is apparently localized in the Barquisimeto region, the greatest center of sisal production in the Republic. Red rot is characterized by a gradual basal discoloration beginning with the bud leaves and then spreading upward to others. After one or more seasons, the buds are affected by a soft rot so that when the bud is pulled the rosette easily separates from the subterranean stem, leaving only the old peripheral foliar crown attached to the plant. An early sign of the disease is the cinnabar-red stain in the stem and the leaf blades. The disease does not appear to spread rapidly from plant to plant. The etiology of red rot of sisal is a matter of dispute. A working hypothesis is, that the disease is carried by a virus. *Colletotrichum agaves* and *Marssonina agaves* are present in Venezuelan sisal fields but they are of little economic importance.

On the island of Hawaii the continued spread of Prickly Pear Cactus over valuable range lands has been of concern to the ranchers for some time. Therefore the Board of Commissioners decided to embark on a biological control program for this plant. An entomologist was sent to California to conduct starvation tests with certain cactus-feeding insects on Hawaiian economic crops. The cochineal mealybug, *Dactylopius opuntiae*, was found safe to introduce and was approved for introduction but the California strain proved to have no interest in the cactus common on Hawaii. A second strain of this mealybug was introduced from Australia and it proved adaptable to the common species and has been liberated. Plants in the warmer regions that have been infested for three months are dropping their pads. Three other new insects have been brought in and liberated, including *Moneilema crassa*, a beetle, *Melittara prodenialis* and *Cactoblastis cactorum*, moths. It is planned to introduce another insect to combat the spread of the cactus in the form of a beetle borer, *Lagocheirus funestus*.

The cochineal, *Dactylopius opuntiae*, was imported from Australia into the Union of South Africa in 1937 when it appeared probable that *Cactoblastis cactorum* would not attain the degree of success in the control of our common pest prickly pear, *Opuntia megacantha*, that had been hoped for. The insect has exceeded all expectations in the destruction of prickly pear. In most inland areas it has periodically and persistently defoliated the large plants, prevented them from bearing much fruit and has killed most seedlings as they have appeared, and it has completely killed many large standing plants.

Dr. Martin Cardenas, well known Bolivian cactus authority, describes three new species and two varieties recently found on a trip between Santa Cruz and Cochabamba. The descriptions with remarks appear in *Revista de Agricultura* for March, 1951. The new items include *Parodia comarapana*, *Weingartia pulquinensis* and its variety *corroanum*, *Echinopsis rojasii* and its variety *albiflora*. The new *Parodia* is a clustering spiny globose species of 18-20 ribs and 18-23 acicular spines. The *Weingartia* is a spherical spiny

cactus with yellowish blooms while its variety differs in having less number of ribs and spines. The taxonomic situation of this critical and rare cactus is also lengthily discussed. The *Echinopsis* is a simple globose cactus with 16 ribs, 8-9 radial and a solitary central spine and magenta flowers. It is related to *E. obrepanda* and known by the common name of "Aya-panku." Its variety has 14 ribs, 6-11 radial spines and 1-3 centrals. Flowers are larger in the variety.

Mr. Walter Pesman wrote about "Colorado Cacti" in the August, 1951, number of *The Green Thumb*, a monthly publication of the Colorado Forestry and Horticulture Association. Mr. Pesman is the author of "Meet the Natives" and you may recall him as one of the principal speakers at our convention in Denver. In the above short illustrated article he presents the Colorado cacti in such a way as to make their recognition easy. He states that about two dozen species have been assigned to Colorado, but less than a dozen are commonly found and a number of these are confined to certain specific regions only. The tree cactus, *Opuntia arborescens*, grows around the 38th parallel and seldom goes more than 20-25 miles farther north. Bushes of it were resplendent with purple flowers during our convention days. We learn of two juicy fruited Prickly Pears, *Opuntia Rafinesquei* and *O. phaeacantha*; also of two dry-fruited, *O. polyacantha* (the most widespread) and *O. trichophora* which was met in the Wet Mountain Valley on our field trip. Pesman calls *Pediocactus Simpsonii* the heaviest drinker of the Colorado tribe, stating that its variety *minor* is occasionally found in swampy ground. We noticed that *Pediocactus* grew in heavy concentrations of fallen pine-tree needles and could be pulled up easily. *Echinocereus viridiflorus* is found in abundance on plains and foothills of Eastern Colorado and is quite inconspicuous because of its diminutive size. Our members discovered quite a few of these on our two-day field trip.

As we were going to press Prof. Helia Bravo Hollis informs us that Carolina Schmoll died September 26. We have indeed lost an old friend.

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Also, that her heir and nephew, Mr. Willi Wagner will be in charge and will conduct business as in the past.

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